CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (currently amended) An isolated and purified nucleic acid molecule encoding an α2δ-4 calcium channel subunit protein, said nucleic acid molecule comprising a member selected from the group consisting of:

(a) a polynucleotide encoding a polypeptide having a sequence ~~and biological activities substantially same as a polypeptide~~ of SEQ ID NO: 10;

(b) a nucleic acid molecule that is complementary to the polynucleotide of (a);

~~(c) a nucleic acid molecule comprising at least 15 sequential bases of the polynucleotide of (a) or (b);~~

~~(d)~~(c) a nucleic acid molecule that hybridizes under a stringent ~~conditions~~ condition to the polynucleotide molecule of (a), wherein said stringent condition comprises washing the hybrid at 65 °C with a buffer containing 0.04 M sodium phosphate, 1% SDS and 1 mM EDTA;

~~(e)~~(d) a nucleic acid molecule that encodes a splice variant of a human α2δ-4 calcium channel subunit comprising exon 1B;

~~(f)~~(e) a nucleic acid molecule that encodes a splice variant of a human α2δ-4 calcium channel subunit comprising exon 37B; and

~~(g)~~(f) a nucleic acid molecule that encodes a splice variant of a human α2δ-4 calcium channel subunit comprising exon 1B and exon 37B.

2. (currently amended) Any one of the nucleic acid molecules of claim 1 wherein the polynucleotide is RNA.

3. (currently amended) Any one of the nucleic acid molecules of claim 1 wherein the polynucleotide is DNA.

4. (currently amended) ~~The~~ An isolated and purified nucleic acid molecule ~~of claim 1,~~ having a nucleotide sequence of SEQ ID NO:9.

5. (currently amended) An expression vector to express an α2δ-4 calcium channel subunit protein in a recombinant host cell, ~~herein~~ wherein said vector contains a nucleic acid sequence encoding a polypeptide having a sequence ~~and biological activities substantially same as a polypeptide~~ of SEQ ID NO:10.

6. (Canceled).

7. (currently amended) A cultured recombinant host cell containing an expression vector of claim 5.

8. (Canceled).

9. (Withdrawn) A protein, in substantially pure form having at least a 95% identity with a polypeptide comprising amino acids 1-1090 of SEQ ID NO.: 10.

10. (Withdrawn) The protein according to claim 9, having an amino acid sequence of: SEQ.ID.NO.:10.

11. (Withdrawn) A monospecific antibody immunologically reactive with an α2δ-4 calcium channel subunit protein.

12. (Withdrawn) The antibody of claim 11, wherein the antibody blocks activity of the α2δ-4 calcium channel subunit protein.

13. (currently amended) A method for expressing an α2δ-4 calcium channel subunit protein in a recombinant host cell, comprising the steps of:

(a) introducing an expression vector capable ~~coapable~~ of encoding ~~an α2δ-4 calcium channel subunit protein~~ a polypeptide having a sequence of SEQ ID NO:10 into a cell; and

(b) culturing the cells under conditions that allow expression of ~~the α2δ-4 calcium channel subunit protein~~ said polypeptide from the expression vector.

14. (Withdrawn) A method for identifying compounds that alter α2δ-4 calcium channel subunit protein activity in a cell, comprising the steps of:

a) contacting a compound with a cell containing an α2δ-4 calcium channel subunit, and

b) measuring a change in the cell in response to the contacting step.

15. (Withdrawn) The method of claim 14 wherein the cell contains three additional calcium channel subunits: an alpha2 subunit, a beta subunit, and a gamma subunit; and wherein the three subunits and the α2δ-4 subunit form a calcium channel complex.

16. (Withdrawn) The method of claim 15 wherein the calcium channel complex is an L-type Voltage Sensitive Calcium Channel.

17. (Withdrawn) The method of claim 15 wherein the measuring step is measuring the influx of Ca^{2+} into the cell.

18. (Withdrawn) A method comprising the steps of:

(a) incubating a cell membrane from a cell expressing recombinant α2δ-4 with radioactive gabapentin (GBP) and a candidate compound, wherein the membrane comprises an α2δ-4 subunit of calcium channel and wherein the incubating step is for sufficient time to allow GBP binding to the α2δ-4 subunit of calcium channels in the cell membranes,

(b) separating the cell membranes from unbound radioactive GBP,

(c) measuring binding of the radioactive GBP to the cell membranes, and

(d) identifying a compound that inhibits GBP binding by a reduction of the amount of radioactive GBP in step (c) to an established control.

19. (Withdrawn) A method for identifying compounds that alters α2δ-4 calcium channel subunit protein activity, comprising the steps of:

(a) combining a compound, a measurably labeled ligand for the α2δ-4 calcium channel subunit protein, and a α2δ-4 calcium channel subunit protein, and

(b) measuring binding of the compounds to the subunit protein by a reduction in the amount labeled ligand binding to the α2δ-4 calcium channel subunit protein.

20. (Withdrawn) A compound active in any one of the methods of claim 14, claim 18, or claim 19, wherein said compound is an agonist or antagonist of an α2δ-4 calcium channel.

21. (Withdrawn) A compound active in the method of claim 14, wherein said compound is a modulator of expression of a α2δ-4 calcium channel subunit.

22. (Withdrawn) A pharmaceutical composition comprising a compound active in the method of claim 14, wherein said compound is a modulator of calcium channel activity.

23. (Withdrawn) A poly peptide having a sequence and biological activities substantially same as a polypeptide of SEQ ID NO:10.